ISP

Update on the Information Center

INPUT®

UPDATE ON THE INFORMATION CENTER

UPDATE ON THE INFORMATION CENTER

CONTENTS

UPDATE ON THE INFORMATION CENTER

EXHIBITS

INPUT

I INTRODUCTION

A. REASONS FOR PREPARING THIS REPORT

- The purpose of this report is to examine and update developments in the information center (IC) and to provide INPUT's recommendations for clients' activities in this area.

- Information centers have evolved as has certain available technology, including fourth-generation languages (FGLs) and personal computers, both of which have an impact on the information center and many end-user departments.

- Major factors in the success of the IC are the growth of personal computers and the acceptance of fourth-generation languages in large organizations. These factors underpin the need for clients to understand and plan for continuing development in personal computers and fourth-generation languages.

B. SCOPE AND METHODOLOGY

- This report is part of the Informations Systems Program conducted on behalf of INPUT's clients and includes the following:

- 1 -

INPUT

- Successful strategies update (Chapter III).

- Status report on the information center (Chapter IV).

- Competitive positioning of the IC (Chapter V).

- Emergence of the development center (Chapter VI).

- Strategic Directions and Issues (Chapter VII).

- The report examines and analyzes current product offerings, significant new developments in user satisfaction levels, emerging technologies, and important issues and trends.

- The research for this report consists of the following:

  - Fifteen telephone interviews.

  - Fifty interviews conducted in conjunction with INPUT's Market Analysis and Planning Services Report, The Opportunities of Fourth-Generation Languages.

  - Two-hundred fifty interviews conducted earlier this year as part of INPUT's Information Systems Program research.

- During these interviews, INPUT gathered primary data and opinions for the purpose of performing analysis for this study.

- In addition to the interview program, extensive research was conducted to explore new product development, to determine overall acceptance for these tools, and to examine the relationship between the end user and the information center.

- 2 -

INPUT

C.   RELATED INPUT REPORTS

- Readers are advised to refer to the following INPUT reports for further information:

    - The Opportunities of Fourth-Generation Languages, September 1983. This report examines opportunities for information systems organizations to take advantage of emerging technologies. It discusses how IS organizations are using fourth-generation languages, their acceptance, and IS plans for future implementations.

    - Organizing the Information Center, August 1983. This is the base report for the current update and is considered important corollary data for the reader. This base report provides extensive data on usage, trends, and end-user applications.

- 3 -

INPUT

II EXECUTIVE SUMMARY

- This Executive Summary is designed in a presentation format in order to:

    - Help the busy reader quickly review key research findings.

    - Provide an executive presentation, complete with a script, to facilitate group communication.

- This presentation covers the primary issues of the IC, including successful strategies, current acceptance levels, competitive positioning, the emergence of the development center, future directions, and INPUT's recommendations.

- The key points of this entire report are summarized in Exhibits II-1 through II-6. On the left-hand page facing each exhibit is a script explaining the exhibit's contents.

- 5 -

INPUT

A. THE INFORMATION CENTER: MAKING END-USER COMPUTING EFFECTIVE IN THE EIGHTIES

- The information center is an internal computer service company run by the IS department to optimize the corporate information resource through the growth and increased effectiveness of end-user computing. It should be a full-service computing report group. "Full service" means that it offers complete products and services including support, training, and consulting.

- The information center (IC) is part of the information systems (IS) department. It is staffed by dedicated personnel who can call on other professionals within IS for special support. As part of IS, the information center can leverage specialized resources as needed to satisfy user requirements.

- The IC provides products and services for end users ranging from executive to clerical personnel.

- The information center, like IS, is vital to optimizing the corporate information resource. Full service--in particular, consulting and training services--is a key issue requiring management attention to ensure the effectiveness of end-user computing.

INPUT

EXHIBIT II-1

THE INFORMATION CENTER: MAKING END-USER COMPUTING EFFECTIVE IN THE EIGHTIES

The Information Center Is:

- **An Internal Business**

- **A Full-Service Computing Support Group**

- **Part of the Information Systems Department**

- **Vital to Optimizing the Corporate Information Resource**

INPUT
UEIC

B.   ELEMENTS REQUIRED FOR A SUCCESSFUL INFORMATION CENTER

- A dedicated trained support staff is crucial for the success of the information center.

    - The purpose of the staff is to provide resources and expertise to allow end users to directly access corporate data and utilize information critical to decision making.

    - Human relations skills, business awareness, teaching or coaching ability, effective listening, and technical awareness are all required of IC staff.

- The software portfolio of IC should include mainframe and microcomputer products such as fourth-generation languages and decision support systems.

- Adequate hardware capacity is a necessity. It is much more difficult than it sounds to plan for the necessary resources to satisfy end-user computing. The difficulty is due primarily to the rapid growth and fluctuations in demand.

- Data resources required include internal as well as external sources available from commercial data base service companies. Internal data resources include accounting data, inventory data, and sales data. External data bases range from Value Line to industry associations.

- Given the other elements, the key factor for successful ICs is trained support staffs having the required skills to support end users and to market to these users and potential users.

INPUT

EXHIBIT II-2

ELEMENTS REQUIRED FOR A SUCCESSFUL INFORMATION CENTER

- **Trained Support Staff**

  - **Provide Expertise and Resources**

  - **Possess Diverse Skills**

- **Software Portfolio**

- **Necessary Hardware Resources**

- **Data Resources**

INPUT
UEIC

C.   ACCEPTANCE OF THE INFORMATION CENTER INDICATES SUCCESS

- Acceptance of the IC concept continues to be high.

    - The scope of responsibility of ICs is increasing, which is evidence that management is satisfied that the IC is moving in the right direction and is capable of supporting end users.

    - The dramatic increase in the number of executive or management users of ICs is further evidence that the concept of ICs is gaining acceptance.

    - The increasing number of personal computers tied to the IC is proof of IC acceptance.

- Acceptance of IC service is also encouragingly high.

    - Acceptance of IC service is best evidenced in the data collected on fourth-generation languages: previous studies indicated that users had serious objections and viewed major issues as real problems. In this more current study, responses were decidedly more positive.

    - Even though most respondents felt that costs associated with ICs are still high, they perceived these costs as justified by improved utilization of the corporate information resource.

INPUT

EXHIBIT II-3

ACCEPTANCE OF THE INFORMATION CENTER INDICATES SUCCESS

Scope of Responsibility of IC

Commitment to Old Methods

Number of Executive and Management Users

Resistance to the IC Concept

Number of Micros Tied to IC

Number and Magnitude of Issues/Problems

Acceptance of the Concept

Decreasing   Increasing

Low   High

CPU Resources

Data Storage

Support and Staff Costs

Programmer Opposition

Acceptance of the Service

Commitment to Old Methods

Lack of Structured Methodology

Lack of Control

INPUT
UEIC

D.   COMPETITIVE POSITIONING REQUIRES CONSTANT TRACKING

- From a product and service point of view, ICs are reasonably well established. Constant tracking and attention can maintain this favorable situation.

    - Since last year there has been a very large increase in the availability of micro-based products and services. Much of this is because ICs have taken a proactive view of the potential competitive threat posed by micros not under control of the information center.

    - RCS vendors are in transition and have lost the competitive advantage during the last one to two years.

- IBM continues to be the dominant supplier of hardware, including personal computer content.

- In the software area the number of products and vendors continues to grow and is the area that requires the most attention from a competitive standpoint.

- Information systems management perceives the system quality and overall cost benefit of IC as positive, but little progress has been made to reduce the programming backlog.

- To maintain the advantage, IC should respond to the highest needs perceived by users. First, improved micro-mainframe links are needed at the application level. Second, human factors need improvement particularly to address new, inexperienced users.

- All parties agree that personal computers, particularly when tied to the IC, offer a competitive advantage. They play a positive role both in the IC and in making users more effective in their use of the corporate information resource.

- 12 -

INPUT

EXHIBIT II-4

COMPETITIVE POSITIONING REQUIRES CONSTANT TRACKING

HARDWARE

434X
303X
Micros
308X

SOFTWARE

SAS
FOCUS
TELL-A-GRAF
RAMIS II
Lotus
NOMAD
MegaCalc
SuperCalc
dBASE II
Data Ease
XSIM
IFPS
Foresight
SPSS
DisplayWrite
MultiMate
WordStar
Volkswriter
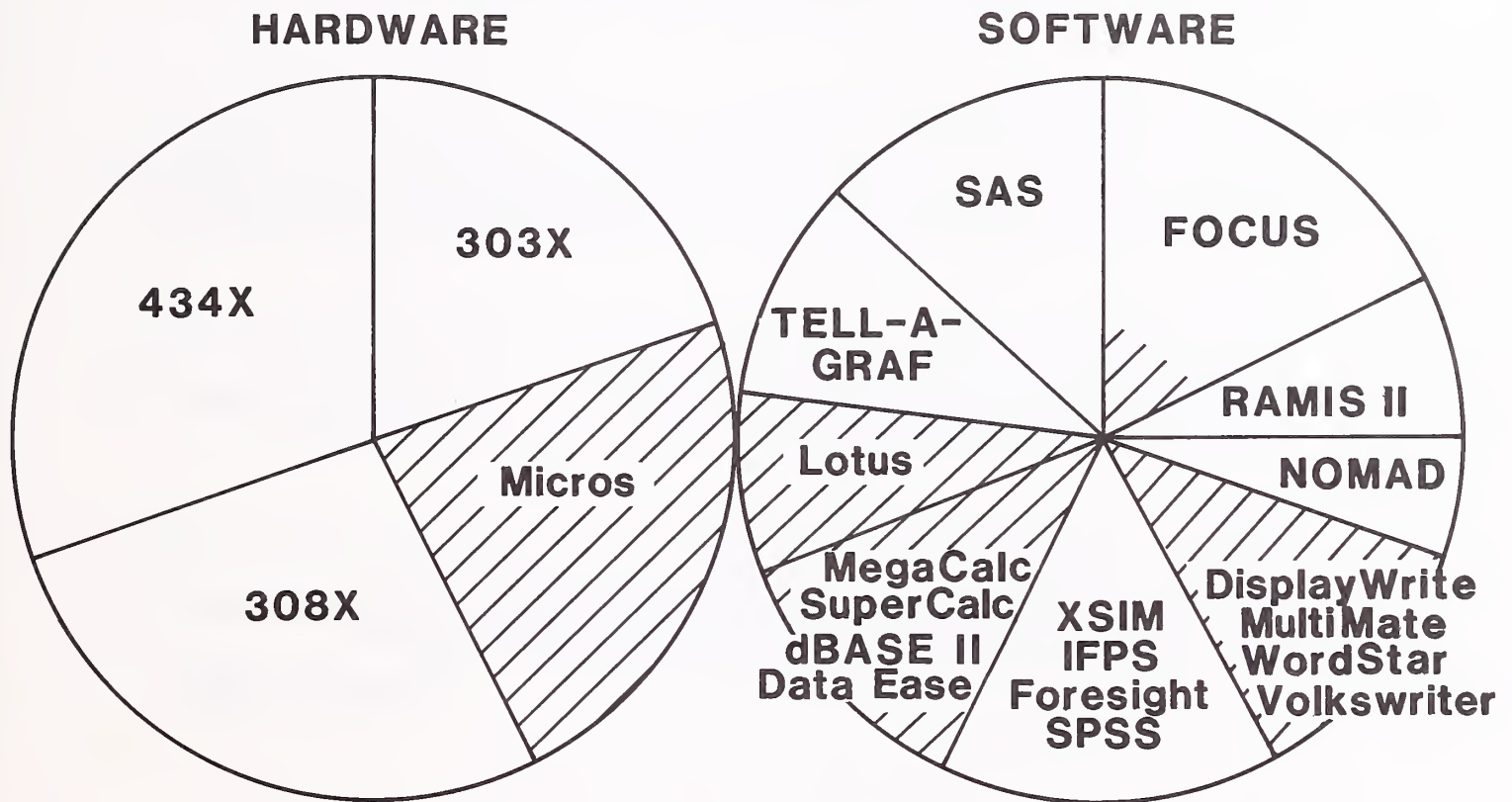
☐ **Mainframe Computer** ▨ **Microcomputer**

- **Highest Needs Perceived**

  - **Improved Micro-To-Mainframe Links**

  - **Improved Human Factors**

- **Personal Computers Tied into IC Are Competitive Advantage**

INPUT
UEIC

E.   STRATEGIC DIRECTIONS ARE BECOMING CLEAR

- The diversity of demands causes a problem for IS since it increases the already difficult task of forecasting operational needs for hardware capacity and staffing.

- One of the shifts identified is increased use by executives and management. This potentially increases the interest of end-user computing throughout the organization and could create significant additional demand on IC resources.

- More terminals and PCs are forecasted to be connected to the IC main-frames.   More devices mean that greater capacity is required to provide service and maintain service levels.

- Departmental systems with multiuser micros are beginning to emerge. INPUT believes this will be a major trend and one that the IC can use to its advantage to relieve pressure from IC data administration activity.

EXHIBIT II-5

STRATEGIC DIRECTIONS
ARE BECOMING CLEAR

- **Diverse Demands**

- **Increasing Use by Executives and Managers**

- **Terminals and PCs Tied to the IC Mainframe**

- **Departmental Systems Emerging**

INPUT
UEIC

F. RECOMMENDATIONS FOR INFORMATION CENTERS

- IS and IC deserve credit for their current success. However, management needs to sustain pressure for continued high service levels and service attitudes.

- Technology will continue to evolve rapidly, requiring management understanding and action to leverage opportunities and to stay one step ahead of user demands.

- INPUT strongly recommends that a plan be developed by all IC organizations for the office. Whether the implementation is within the IC, it is too complex and critical an issue to just let happen; it needs detailed planning.

- Support and service are important, but INPUT believes the real benefits of the IC will be realized when support and services are expanded and IC professionals can be deployed as consultants and trainers.

- The sheer number of users tied to the IC will create very high and perhaps unmanageable demand on the IC mainframe. Left unchecked, this could undo all the prior success.

- INPUT believes the current rate of technological activity requires dedicated professional staff and management attention if the corporation is going to get full benefit. A combination of IS and operational management will produce the best result.

INPUT

EXHIBIT II-6

RECOMMENDATIONS FOR INFORMATION CENTERS

- **Keep the Pressure on Service**

- **Plan for Continued Technological Developments**

- **Don't Overlook Office Systems**

- **Emphasize Training and Consulting**

- **Start Planning How to Avoid Disaster from Data Access Demand**

- **Assign Staff to Track Technology**

INPUT
UEIC

III SUCCESSFUL STRATEGIES FOR THE INFORMATION CENTER

- This chapter examines what is required to initiate the IC and what activities have transpired since last year that affect the successful operation of the IC.

- Chapter III of INPUT's 1983 report <u>Organizing the Information Center</u> is more detailed and is recommended for organizations setting up an IC for the first time.

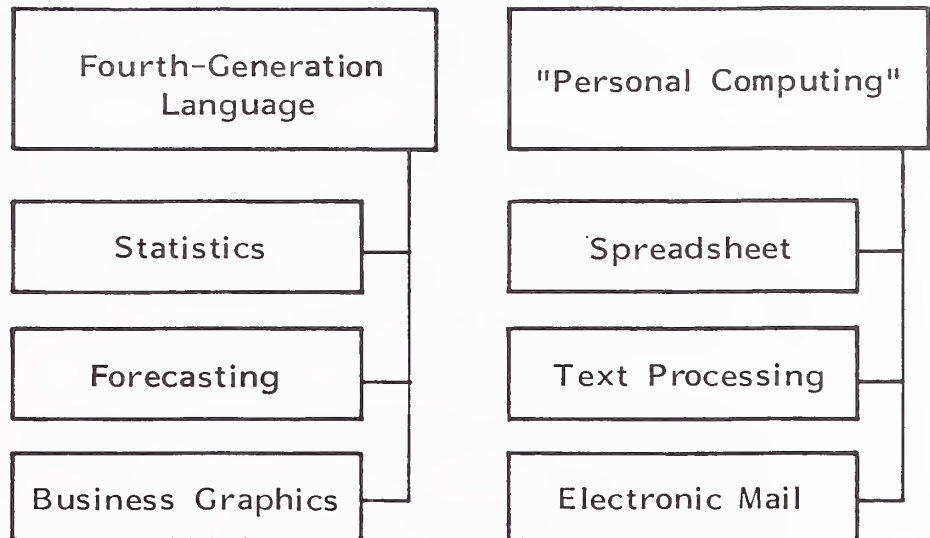## A. INFORMATION CENTER ELEMENTS

- The primary elements contained in the IC are:

    - A software portfolio.

    - The necessary hardware resources.

    - Data resources.

    - A trained support staff.

- These elements were identified in last year's report, and this year's research underpinned their validity and uncovered additional detail on how the elements should come together.

- 19 -

INPUT

- Although a "portfolio of software" sounds as if it means many different programs, the quantity of programs is not as important as a well-conceived portfolio. This concept is explored in greater detail in Chapter IV.

- INPUT recommends that the portfolio include the product categories contained in Exhibit III-1. Most companies surveyed offer such a portfolio.

    - Although it is desirable that these products "talk" to one another, there are many good current solutions that do not allow transfer of data between products. In fact, no totally comprehensive package will satisfy all needs. Nor should management wait for the panacea of products and services, since sufficient benefits of IC are achievable with today's technology.

    - INPUT recommends that designs for internal applications include detailed considerations for micro-mainframe linkages and data base access.

- In selecting the products identified in this exhibit, the product should be selected that best meets the principal need rather than a complex compromise for many needs. This exhibit was developed for the 1983 study and is offered here since it still applies to the needs of the product mix.

- Although electronic mail (E-mail) continues to look like a positive application to implement, INPUT did not find evidence of increased use. INPUT believes this is primarily a cost issue due to the cost of local area networks (LANs) and the lack of justification for E-mail.

- Last year's trend to greater use of fourth-generation languages that have less dependence on conventional programming languages has continued. Today, fewer ICs even offer conventional languages.

- 20 -

INPUT

EXHIBIT III-1

INFORMATION CENTER SOFTWARE PORTFOLIO

GENERAL:

Fourth-Generation Language	"Personal Computing"
Statistics	Spreadsheet
Forecasting	Text Processing
Business Graphics	Electronic Mail

APPLICATION SPECIFIC:

Engineering/Scientific	Business Operations
Module Library	General Ledger
Engineering Graphics	Inventory

PROGRAMMER SUPPORT:

DBMS	Programming Languages
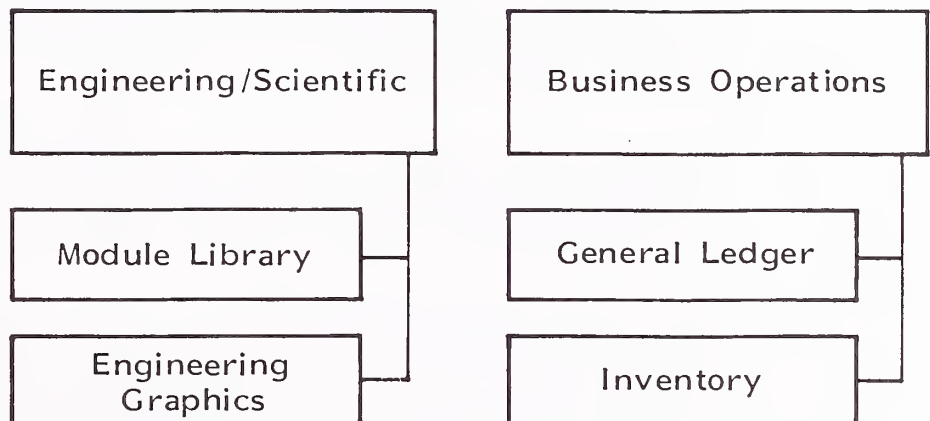
INPUT
UIOC UEIC

- Similarly, the interest in developing business applications libraries still exists. However, INPUT did not find major plans under way to address this issue.

- Exhibit III-2 lists the major steps in identifying and cataloging software modules as a step toward establishing the library. It is reprinted from the 1983 report, which details steps for establishing a library.

- The cost of hardware has not been a major deterrent to the growth of the IC. In many instances ICs cite an increased requirement for more and more hardware but are not delaying plans to meet the demand. In fact, their problem is being able to adequately forecast demand from the user community.

- The hardware employed for the IC should include adequate mainframe resources, preferably dedicated, and the appropriate number of terminals or microcomputers attached to the mainframe.

  - Although any mainframe can satisfy the requirements of the IC, the dominant vendor continues to be the one that coined the term "information center"--IBM.

  - During the research for this update, INPUT found only one non-IBM mainframe being used as an information center host machine.

  - Since IBM has been so dominant in this area, most of the available independent software is for IBM hardware. This means that ICs looking at other hardware must be sure there is adequate software to complete the portfolio.

- To a large extent the amount of hardware required is determined by experience, since each organization has different needs. Last year's report and INPUT's Annual Information Services Industry Report for 1983 will provide the reader with additional information.

INPUT

EXHIBIT III-2

SOFTWARE MODULE IDENTIFICATION

- Creator Information

  - *Department
  - *Person(s)
  - Dates
    - *Creation
    - *Modification
  - Type of Use:
    - One Time
    - Ongoing

- Subsequent Users/Adaptors

  - *Department(s)
    - *Person(s)
    - *Dates of Initial/Subsequent Modification
  - Type of Use:
    - One Time
    - Ongoing

- Brief Narrative (Optional)

- Security Status

  - Personal Use Only
  - Department Use Only
  - Approved Access
  - Unlimited Access

- Type of Use

  - Algorithm
  - Report
  - Transformation (e.g., Consolidation)

- Data Elements Used

  - *Input
  - *Output

- Classification

  - Functions
  - Applications

- Quality Assurance Status

* Subject to Automatic Acquisition.

INPUT
UOIC UEIC

- Two types of data, external data and internal data, are required by the IC.

  - External data is obtained from a growing number of outside services suppliers and normally is acquired ready for use in the company. Since IS is typically responsible for this activity and for the acquisition and dissemination of internal data, IS is the logical source for both types of data.

  - Data acquisition should be centralized for access control and cost containment.

  - In addition, many types of analysis (in particular, using decision support systems) need both types of data to be intertwined, so a centralized function is most logical.

- The support functions required by the IC are similar to those required for normal operations and include the following:

  - Operations staff.

  - Programming staff.

  - Product support specialists.

  - Data administration.

  - Training.

- Other support and service considerations include the following elements:

  - Direct user support. The user interface area is one of critical importance and needs to be competitive with the levels of support expected from outside services companies.

- 24 -

INPUT

-   Information center consulting. This includes support in identifying and implementing IC-based solutions. INPUT found this to be the area that IC management is trying to concentrate on, to maintain high service levels. Consulting services should be provided by trained staff, just as the term "consulting" implies. Otherwise, users will choose consulting services outside the IC and probably outside the company.

- With the expected growth in executive and management use, IC management will need to look carefully at any specific or unique support requirements and to develop appropriate support strategies. Due to the potential sensitivity of these new users, INPUT recommends that IC management conduct a needs analysis to gather data for the development of detailed plans to ensure the success of IC for these important new customers.

B.   IMPLEMENTING THE INFORMATION CENTER

- The IC is a service and a concept, and as such it must be marketed. Much of the success in implementing the IC is dependent on satisfying the user, the IC customer. Good marketing practices can improve the likelihood of success.

- Exhibit III-3 shows the steps in implementing the information center. This is a logical sequence and one that enhances the probability of success of the IC.

    -   Based on this year's survey, INPUT feels that IC management should audit its operations and consider reintroducing IC service, offering an updated promotion of the service and its value or benefit to end users.

    -   Periodic reviews of the product offering, service levels, and overall user satisfaction should be conducted to ensure that IC is competitive.

INPUT

EXHIBIT III-3

STEPS IN IMPLEMENTING THE INFORMATION CENTER

```
┌─────────────────────────┐
│    Select User Panel    │◄──┐
└─────────────────────────┘   │
            │                 │
            ▼                 │
┌─────────────────────────┐   │
│     Identify Needs      │◄──┤
└─────────────────────────┘   │
            │                 │
            ▼                 │
┌─────────────────────────┐   │
│     Define IS Goals     │◄──┤
└─────────────────────────┘   │
            │                 │
            ▼                 │
┌─────────────────────────┐   │
│  Define Market Targets  │◄──┤
└─────────────────────────┘   │
            │                 │
            ▼                 │
┌─────────────────────────┐   │
│    Identify Software    │◄──┤
│   and Hardware Needs    │───┐
└─────────────────────────┘   │
            │                 │
            ▼                 ▼
┌─────────────────────────┐  ┌──────────────────┐
│     Define Pricing,     │◄─┤ Train User Support│
│   Support and Control   │  └──────────────────┘
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│     Train Trainers      │◄──┤
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│       Pilot Test        │◄──┤
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│   Audit the Products    │
│      and Services       │
└─────────────────────────┘
```

- 26 -
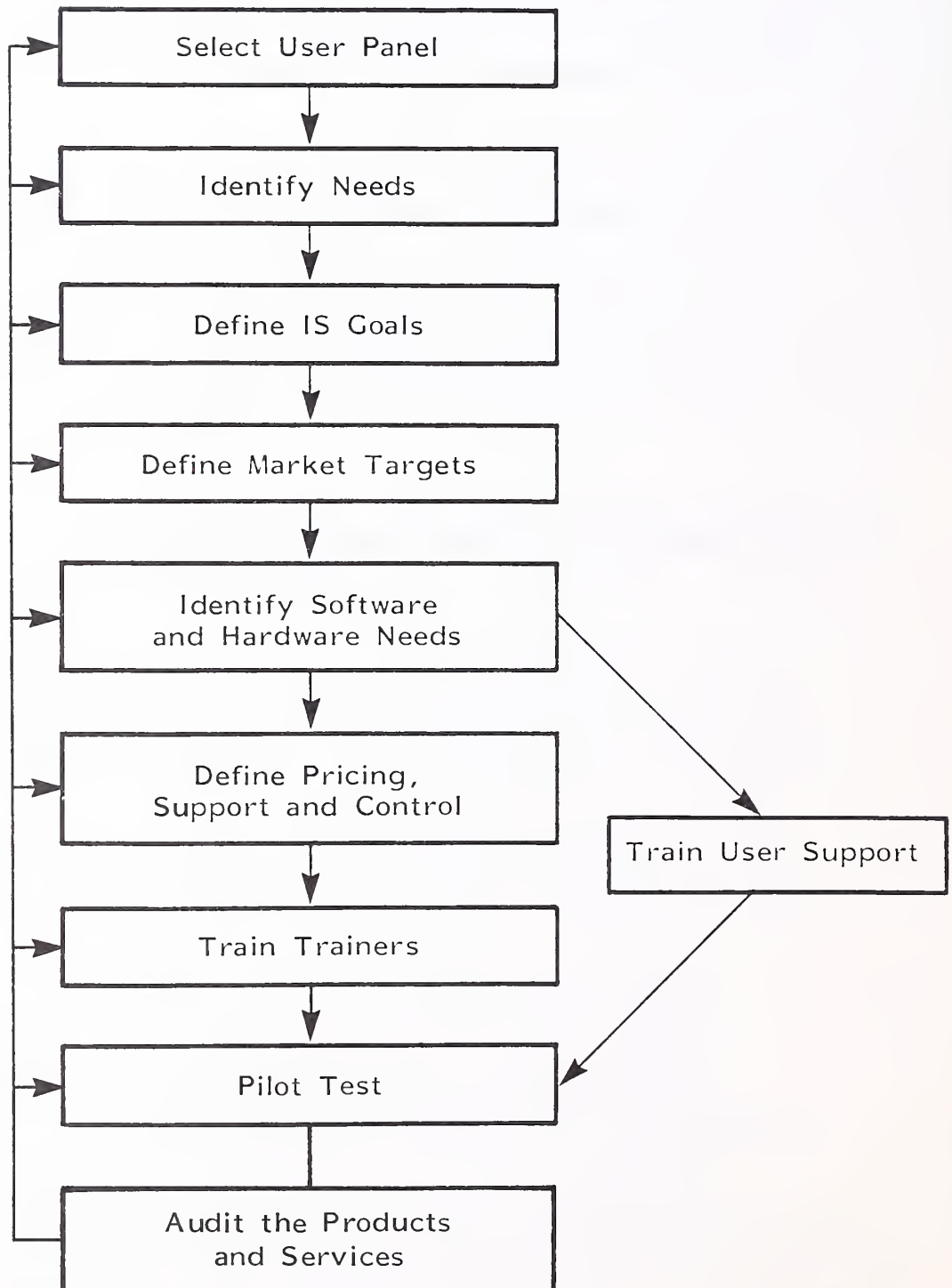
INPUT
UOIC UEIC

- The consultant role of IC is one that most experts feel to be an important role. However, INPUT found that less than 20% of the IC organizations include consulting in their scope of responsibility.

C. COMPLEXITY OF PROVIDING INFORMATION CENTER SERVICES

- In order to be competitive, the IC needs to operate as a business. A good model would be any major RCS vendor, since these vendors have been working at being competitive for more than a decade.

    - Aggressive organizations may even consider hiring IC managers from these RCS vendors.

    - Other sources are the organizations that have ongoing IC operations, since many have now been in operation for more than five years. The larger IS organizations are potential candidates to approach for information or advice.

- Exhibit III-4 shows the complexity of the information center and its many interrelationships. Nearly all of these functions are ongoing everyday, making management even more complex.

- The major areas of emphasis during the last two years, relative to IC functions, are shown in Exhibit III-5. The areas of emphasis--except data access and control--are changing. The exhibit also demonstrates the following:

    - Over 75% of the respondents report continued emphasis on data access, data control, and overall security-related issues.

    - Over half the respondents increased their support and their training activities in 1984 with the objective of improving the utilization of the company data as a resource.

- 27 -
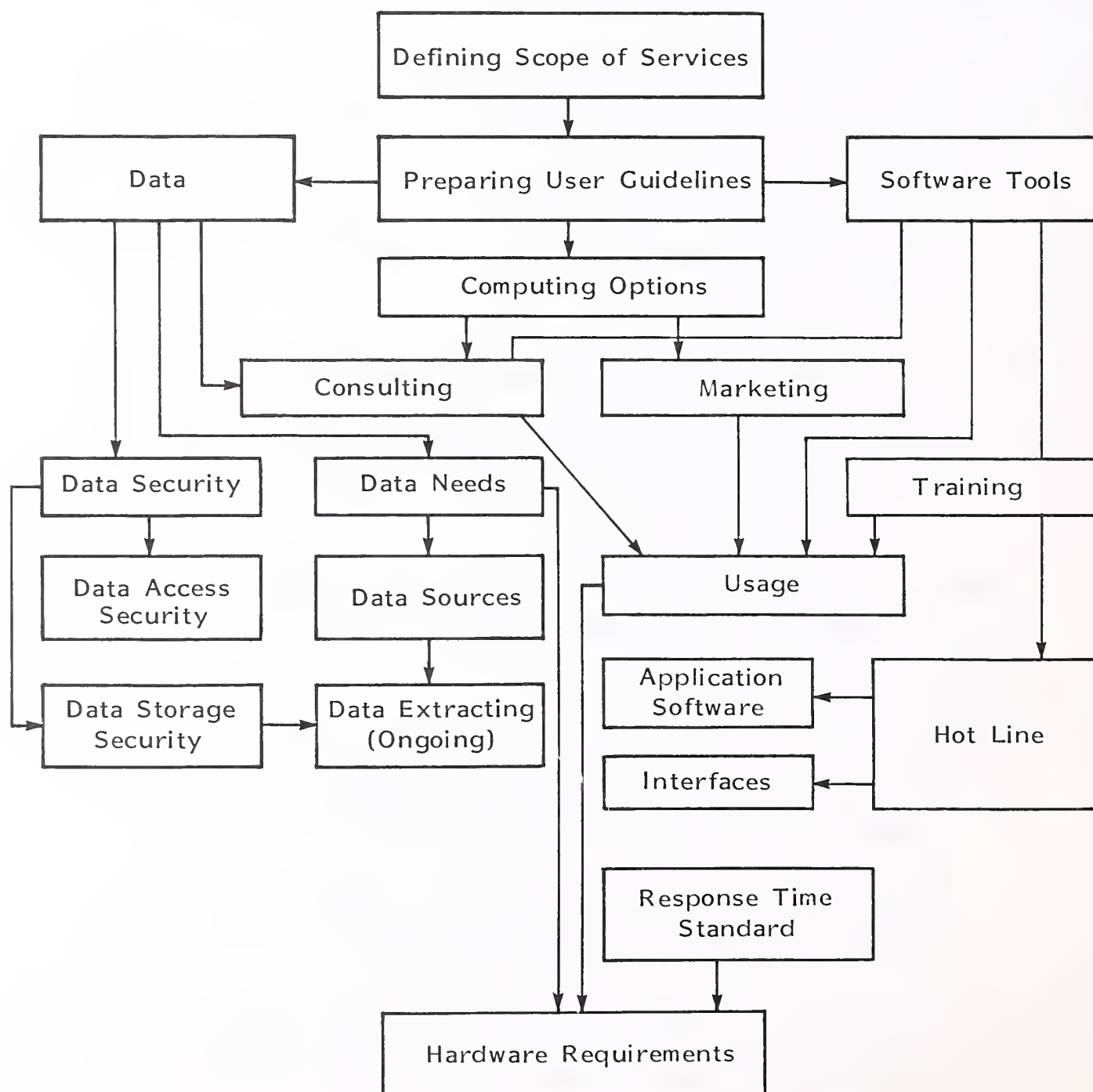
INPUT

EXHIBIT III-4

INTERRELATIONSHIP OF INFORMATION CENTER FUNCTIONS

INPUT
UOIC UEIC

EXHIBIT III-5

EMPHASIS OF IC FUNCTIONS IS CHANGING

Control of Data,
Data Access,
Security

Support, Training,
Use of Data

Installing Micros as
Part of IC Strategy

IC Responsible for
Office Systems

1983

Control of Data,
Data Access,
Security

Support, Training,
Use of Data

Installing Micros as
Part of IC Strategy

IC Responsible for
Office Systems

1984

0   25   50   75   100%

Percent of ICs Emphasizing Feature

- 29 -

INPUT
UEIC
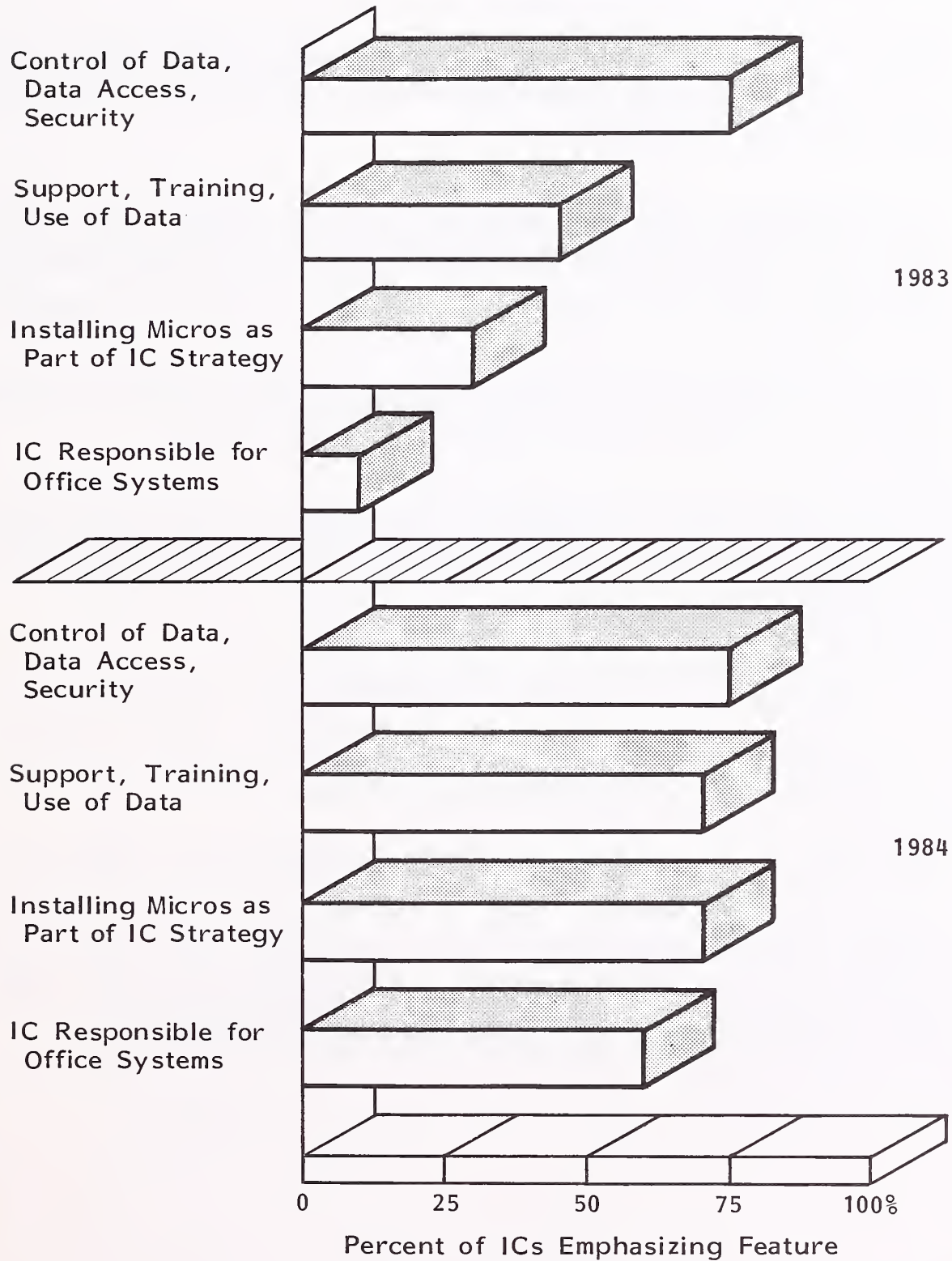
- Nearly 40% of the ICs installing micros report that they are actively evaluating and adding new software tools, nearly all of which are microcomputer-based tools.

- With the growing number of personal computers being installed as part of the IC strategy, INPUT believes management should be active in PC selection and procurement for the end user.

- The most common dedicated mainframe is the 4341. Having dedicated hardware is very desirable but not often achievable due to rapid growth, cost, and other needs. This provides additional impetus for the acquisition of more PCs.

- There is increasing evidence that the IC and PC functions are coalescing. Many ICs are already combining support of these two functions.

    - In fact, several organizations have established end-user computing departments that combine IC and PC functions as well as office technology.

    - INPUT found that 10% of the respondents have included office technology in the scope of the responsibility of the IC. INPUT expects this to grow to 60% by 1984 (see Exhibit III-5).

- The ongoing success of the IC is dependent on attention to the fundamentals-- the primary elements of a software portfolio, the necessary hardware resources, data resources, and a trained support staff. These fundamentals, together with management attention and an expanded scope of the support staff, will ensure the continued success of the information center.

INPUT

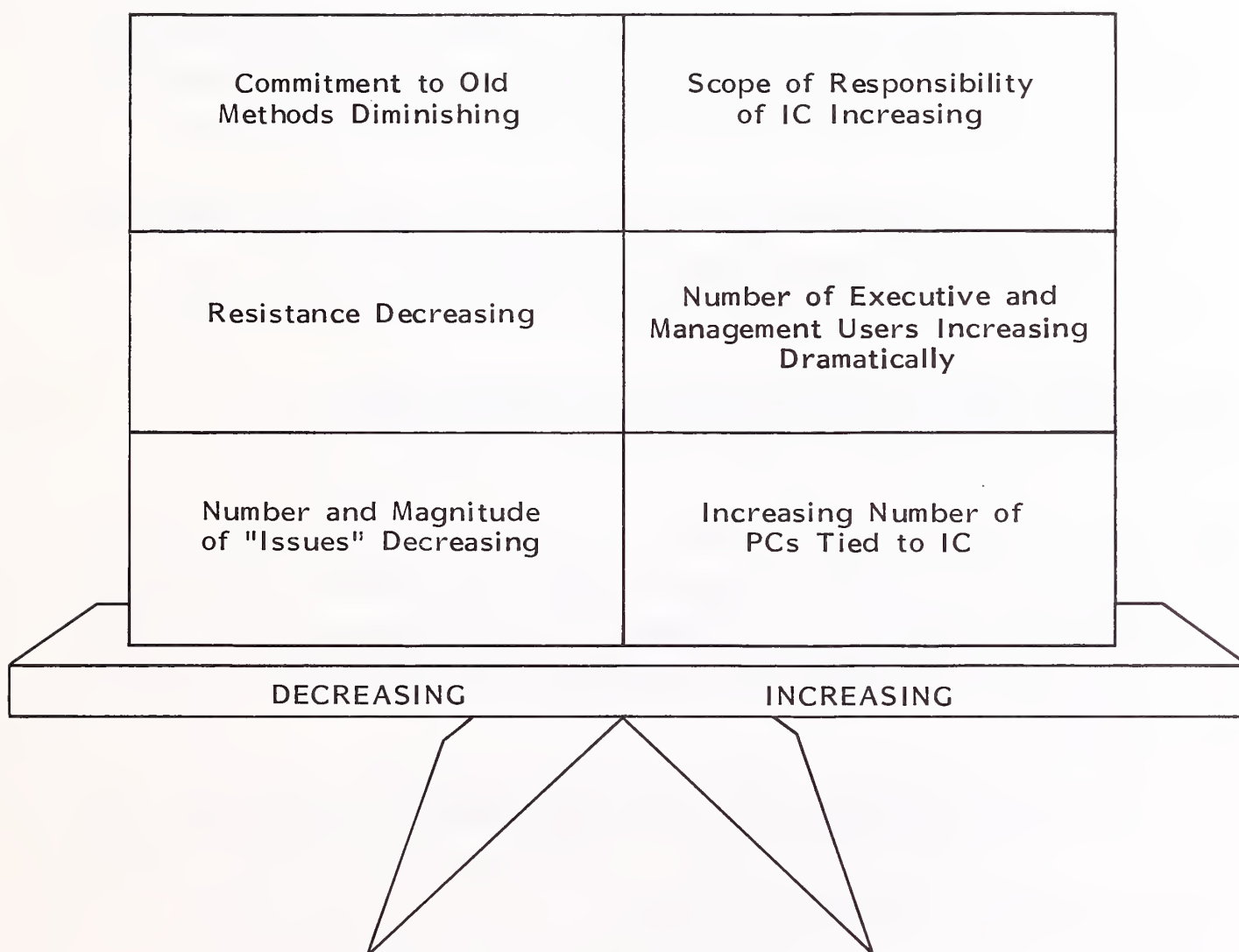# IV   STATUS REPORT ON THE INFORMATION CENTER

A.   ACCEPTANCE OF THE INFORMATION CENTER CONCEPT

- The range for the length of time respondents have provided IC service was four months to seven years, with an average of 3.3 years.

- Overall, the reaction to the acceptance of the concept is satisfactory or better. INPUT feels the most revealing data collected on the growth and acceptance of the IC is that the highest growth of the IC is in the executive and executive staff levels of the organization. In many cases this was in terms of both percent and absolute numbers of forecasted new users.

- The category of managers and managers' staff was the highest in absolute terms in 1984. INPUT believes this category will reflect a higher than fore-casted growth due to the high acceptance by executive management and the pressure they will bring on lower management.

- Although acceptance by the programming staff has been relatively good, INPUT believes that the emergence of the development center (DC) with its programmer tools and approach will attract this set of users and will allow the IC management to focus on true end users. (The DC will be discussed in greater detail in Chapter VI.)

- 31 -

INPUT

- INPUT believes the biggest attraction for the programming staff was the availability of fourth-generation languages, which programmers wanted to learn and use to remain professionally up to date.

- In fact, fourth-generation languages play a strong role with all users of the IC, and they are largely responsible for the high levels of acceptance of the IC.

- As evidence of this fact, the most common software products installed (over 90%) in ICs are fourth-generation languages.

● Over 90% of the respondents reported that the IC has increased user satisfaction with IS services and has increased user ability to take advantage of the corporate information resource.

● Acceptance of IC is measured by several factors in the survey. Although some of the factors are not specific, INPUT believes that areas such as forecasted growth in the number of executive and management workstations do give a concrete underpinning of the level of acceptance of the IC concept.

● The balance of factors demonstrated in Exhibit IV-I is important since it shows that the positive aspects of the IC and the diminishing negative aspects are both favorable.

● Further proof of the increasing acceptance of the IC concept is the trend for executives to have their staffs use the IC and IC tools. INPUT believes this will have a snowball effect and will further contribute to the demand on IC resources.

● In last year's report INPUT cited the following requirements for a successful information center:

- A balanced software portfolio.

- A rich support environment.

INPUT

EXHIBIT IV-1

THE IC: A WELL-BALANCED SUCCESS STORY

Commitment to Old Methods Diminishing	Scope of Responsibility of IC Increasing
Resistance Decreasing	Number of Executive and Management Users Increasing Dramatically
Number and Magnitude of "Issues" Decreasing	Increasing Number of PCs Tied to IC

DECREASING   INCREASING

INPUT
UEIC

- This survey revealed that IC management has provided an increasingly rich environment in both categories. The only shortfall from INPUT's recommendations has been in the area of application-specific software, which appears to be taking longer to implement due to staffing limitations.

- Although the desire to provide a rich support environment is clear, it is not clear these organizations will be able to fulfill their intent. In related research conducted during 1984, INPUT found the staffing plans included 50% increases for IC support, which appears adequate for the anticipated increase in the demand for IC services.

  - The concern is that without adequate staffing the IC may not continue to fulfill its promise either in satisfying end users or in delivering the potential benefits to the organization.

  - Once the demand exists, the IC must have adequate and appropriate resources to respond or users will look elsewhere.

B.   ACCEPTANCE OF THE INFORMATION CENTER SERVICE

- INPUT believes that IS management will need to continue to take steps to ensure that satisfaction remains high. One area of concern is that adequate staffing be required to keep supporting users. Evidence this year validated last year's preliminary findings that support resources were falling behind the demand.

  - To be successful, the IC must provide service that at least approaches that of the RCS vendors. It must include provisions for product support, service, and training.

INPUT

- INPUT believes that IS management should further develop the IC to provide more than the normal support. It is recommended that the IC role of information consultant be developed so IC would advise users, specify products, do systems analysis, and guide user development.

- Some of the greatest contributions of the IC have come in prototyping. The need for professional support in this activity is critical as the applications get more complex and payoff becomes greater. Judging by the forecasted demand, IS management needs to plan aggressively to be able to meet the demand in products, services, support, and training.

- On the positive side, INPUT expects that the success of the IC will spawn new service products from a growing number of vendors. Many of the needed services, then, could be contracted.

- Fourth-generation languages are installed in over 90% of the ICs and have come to be synonymous with the IC. One of the ways INPUT used to test acceptance of the IC was to examine the issues of FGLs.

  - Exhibit IV-2 shows issues relating to fourth-generation languages and their use in the IC. These issues appear to support acceptance of the IC service.

  - As the exhibit demonstrates, the increased need for hardware resources are considered high. Other data in this survey show it is not high relative to the expectations of IC management.

  - This is significant since it implies that management will continue to fund hardware increases needed to support the end-user demand.

- Opposition from the programming staff is very low. INPUT believes this is due to their interest in staying current with evolving technology--in this case, fourth-generation languages and microcomputer software. In addition, there

INPUT

EXHIBIT IV-2

PROBLEMS AND ISSUES OF FOURTH-GENERATION LANGUAGES

ISSUE	IMPACT OF FGL ON THE IC
● Hardware Resource Increases	
– CPU	High
– Data Storage	Medium
● Programmer Opposition	Low
● Staff and Support Costs	Medium
● Commitment to Old Methods	Low
● Lack of Structured Methodology	Low
● Loss of Control, Data, Systems	Low

INPUT
UEIC

has been internal pressure as more organizations are developing user interfaces and internal applications software.

- INPUT feels the other FGL issues cited in the exhibit are low due to the acceptance of the IC service and the maturing of the IC which is now, on the average, nearly three and one-half years old.

- Exhibit IV-3 lists perceived benefits from the 1983 study and compares how IC management perceives those benefits one year later.

- Two categories, user-maintained systems and user-built systems, rank high as benefits and reflect a growing trend determined by other related research: management is increasingly aware of the value of identifying approaches that will conserve their technical resources. Further evidence of this trend is revealed in the exhibit by the continuing emphasis on the increase in software productivity and the growing emphasis on faster implementation. INPUT expects these trends to continue.

- As users become more competent with various products, they have the potential to become advisors or to support consultants and supplement the IC technical staff.

- In last year's report, INPUT advocated a comprehensive portfolio of software. This update found that many respondents do offer a variety of products and services. Balancing the need for a portfolio and the need for comprehensive support is still of concern. Trying to balance these needs usually results in compromises, although in this instance INPUT believes compromise is preferable to having a plethora of unsupported products.

INPUT

EXHIBIT IV-3

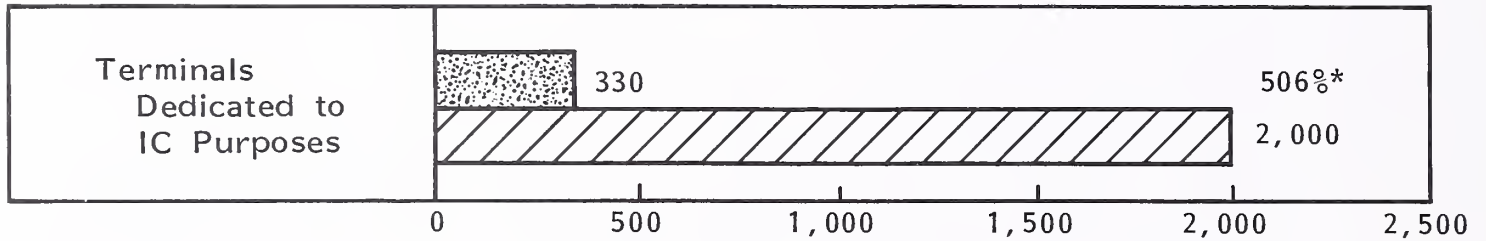INFORMATION CENTER BENEFITS-
INFORMATION SYSTEMS VIEWS

1983-1984

BENEFIT	IMPORTANCE OF BENEFIT, AS PERCEIVED IN:	
	1983	1984
User-Maintained Systems	High	High
Reduced Backlog	High	High
Increased Software Productivity	High	High
Faster Implementation	Medium-High	High
User-Built Systems	Medium	High
Easier Prototyping	Medium	Medium
Higher Quality Software	Medium	Medium
Intrafirm Communications	Medium	Medium-High
Organizational Productivity	Medium-Low	Medium
Better Decision Making	Medium-Low	Medium
Access to Information	Low	Low
User Control	Low	Medium

- 38 -

INPUT
UOIC UEIC

C.   HARDWARE AND SOFTWARE AVAILABILITY

- The most pronounced shift from last year is the increase in microcomputers and microcomputer software. The dominant micro software products are typical productivity software tools that do not require connection to the mainframe. Ironically, nearly all organizations are striving to "integrate" the micro to the mainframe.

- Exhibit IV-4 highlights the growth of two classes of workstations, growing at 506% and 233% respectively. Clearly, organizations are showing commitment to the IC in their willingness to invest in hardware.

- Although other personal computers are being acquired, the majority are being acquired for use with the information center.

- On the mainframe side, the predominant software continues to be fourth-generation language software. FOCUS, NOMAD, and RAMIS II account for over 80% of the installations.

- The remaining IC tools include a wide array of products and services ranging from graphics to decision support systems, from report writers to query processors.

  - A large portfolio of software is necessary for the success of the IC. However, management should remember that every product or service includes a needed element of support and a related amount of management attention.

  - In addition, care should be taken not to provide overlapping products and services, which further increases inefficiency in support and training.
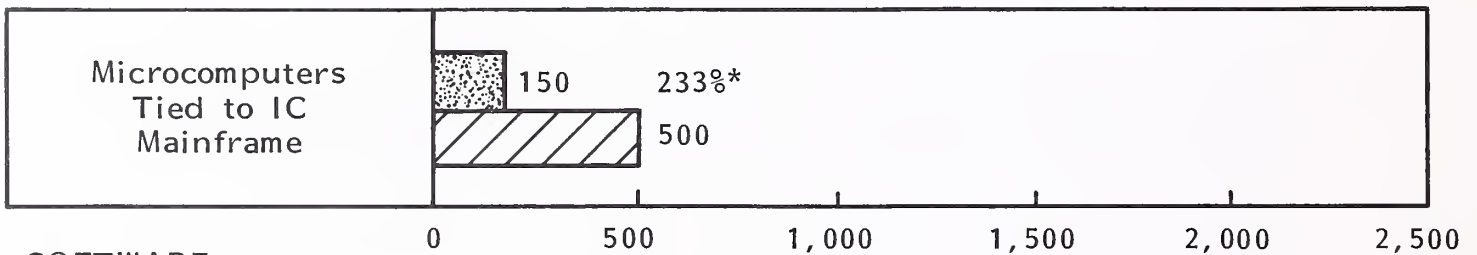
INPUT

EXHIBIT IV-4

HARDWARE AND SOFTWARE AVAILABILITY

	Terminals Dedicated to IC Purposes	330	506%*

Bar chart: Terminals Dedicated to IC Purposes — 1984 value 330, 1986 value 2,000, total growth 506%*. Horizontal axis: 0, 500, 1,000, 1,500, 2,000, 2,500.

SOFTWARE:

FOCUS	SAS	TELL-A-GRAF
RAMIS II	IFPS	
NOMAD	SPSS	
ADRS	FORESIGHT	
	XSIM	

Bar chart: Microcomputers Tied to IC Mainframe — 1984 value 150, 233%*, 1986 value 500. Horizontal axis: 0, 500, 1,000, 1,500, 2,000, 2,500.

SOFTWARE:

Lotus	FOCUS PC	WordStar
SuperCalc	dBASE II	MultiMate
MegaCalc	DataEase	DisplayWrite
		Volkswriter

▨ 1984 Average per IC Organization

▨ 1986 Average per IC Organization

* Total Growth

INPUT
UEIC

- Although detailed product evaluations are time consuming, the payoff can be worthwhile even in the micro area, since vendors are more likely to negotiate to provide support to a potentially large base of ongoing new business if that is a condition of the procurement.

INPUT

V   COMPETITIVE POSITIONING

A.   COMPETING SERVICES

- The evolution of the information center has generally resulted in a paradox of competition; the competitors of the IC are also suppliers of services offered through the IC.

    - RCS vendors are still competitors. However, many supply special services, such as data bases, that are required by users of the IC. INPUT believes IC management can leverage these vendors and at the same time diffuse the competitive threat. The main consideration is for IC management to be aware of these competitors and their activities so IC can selectively move applications from these vendors as appropriate to satisfy overall corporate information goals.

    - The personal computer is similarly both a competitive threat and an opportunity for IC management. INPUT found that IC management is winning this competitive battle, since two and one-half times as many PCs are planned to be tied to the IC mainframe as are planned for standalone applications.

- IC management should keep in mind that the RCS firms are competitors and, like any competitive threat, should be tracked and treated as competitors. The following represent considerations for management wishing to be proactive in these competitive situations:

- 43 -

INPUT

- IC services can be superior and more cost-effective than outside services if management continues to strive to offer superior service.

- End users will choose the best source, service, and cost to solve their immediate problems.

- The IC can offer an important service: access to the corporate data base. This should be leveraged.

- RCS vendors can be used effectively by IC management for a number of purposes--for example, applications development, network services, and special data base services.

- One service the IC should offer is consulting, since it is a favorite weapon of RCS vendors. It is also a service in which the payoff in end-user productivity can be very high.

- Regarding personal computers, there are also a number of actions IC management can take to lessen the competitive threat and in many cases enhance the service offering and image of the IC itself. INPUT suggests that IC may:

  - Offer PCs as part of the IC service offering, including a walk-in center where users could come to try out various supported personal computers.

  - Integrate the PC into applications running on the IC mainframes including linkages to corporate data bases.

  - Offer PC software with support and training. This has a dual benefit: it ties the user into the IC and helps the user be more computer literate, which benefits the corporation's utilization of information.

- 44 -

INPUT

- Management should be aware that the formula for success of the IC is a combination of attitude, products, services, support, and technology.

  - INPUT is concerned that the credit for the success of the IC not be given solely to technology. One obvious example of such an error is in the case of the PC.

  - Clearly, vendors such as IBM and Apple would like top management to give credit for IC success to technology. And certainly technology's role has been significant. However, it is only one ingredient in the formula.

  - INPUT feels it is important that IS management take the initiative to dispel this misconception. The alternative is to live with misinformed managers who may think that applying technology will in itself solve information problems.
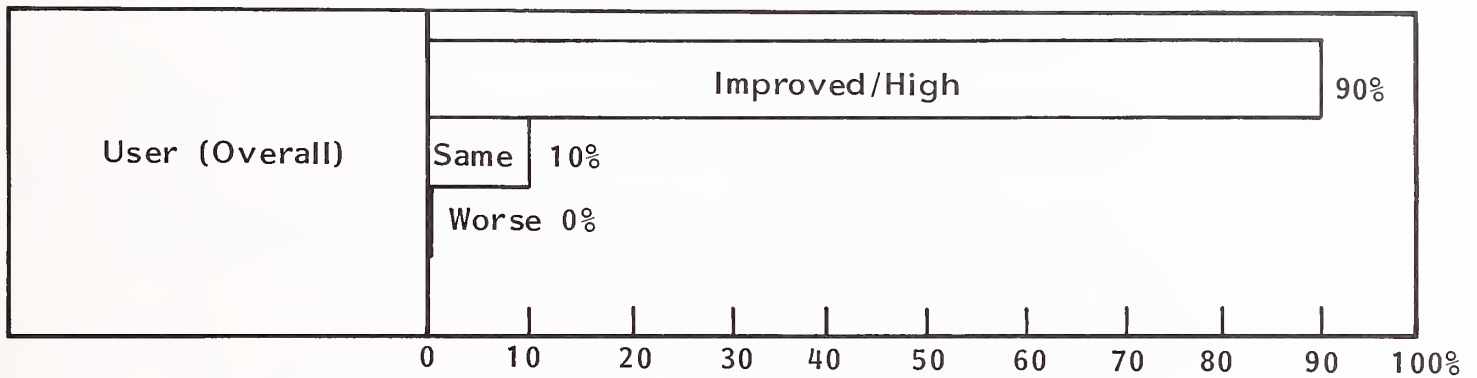
B.   SATISFACTION LEVELS

- Although INPUT found that user satisfaction with the IC is in good health, IC management should continue sound practices to maintain this healthy condition. Some of the practices INPUT believes to be effective are:

  - Developing and maintaining an early warning system. This can consist of user surveys and focus groups to measure satisfaction and to become aware of any negative trends. This will allow corrective action to be applied before problems turn into epidemics.

  - Assigning specific support staff members to major users and making them accountable for those users' satisfaction.

- 45 -

INPUT

- Since top management tends to measure satisfaction by the quantity of (or the absence of) complaints, IC management should develop a "zero defects" type of program and instill that spirit in the IC staff.

- Given the nature of fourth-generation languages, the IC can be responsive to user requests for minor changes. Given users' perception of IC's nonresponsiveness to changes, the IC can turn this around and take the offensive. The advantage this creates allows IC to potentially avoid the no-win position that IS and IC often find themselves in.

- As stated earlier, INPUT found the user satisfaction level to be high. Similarly, IS management is seeing progress in many issues concerning them.

  - Exhibit V-I shows the overall level of satisfaction among the user community. Ninety percent of those surveyed feel the service is improving and satisfaction is high.

  - However, a high percent also said they wanted to see better micro-mainframe linkages and improvements in human factors (both hardware and software user interfaces).

  - IS management concurs that programming backlog has been decreased, but not dramatically. In fact, some respondents felt there have been some increases.

  - The largest improvements have come in system quality and the value of the PC as a resource in the information center.

  - The most difficult areas of IC management to improve are determining what resources are required to meet user demand and deciding how to budget for those resources.
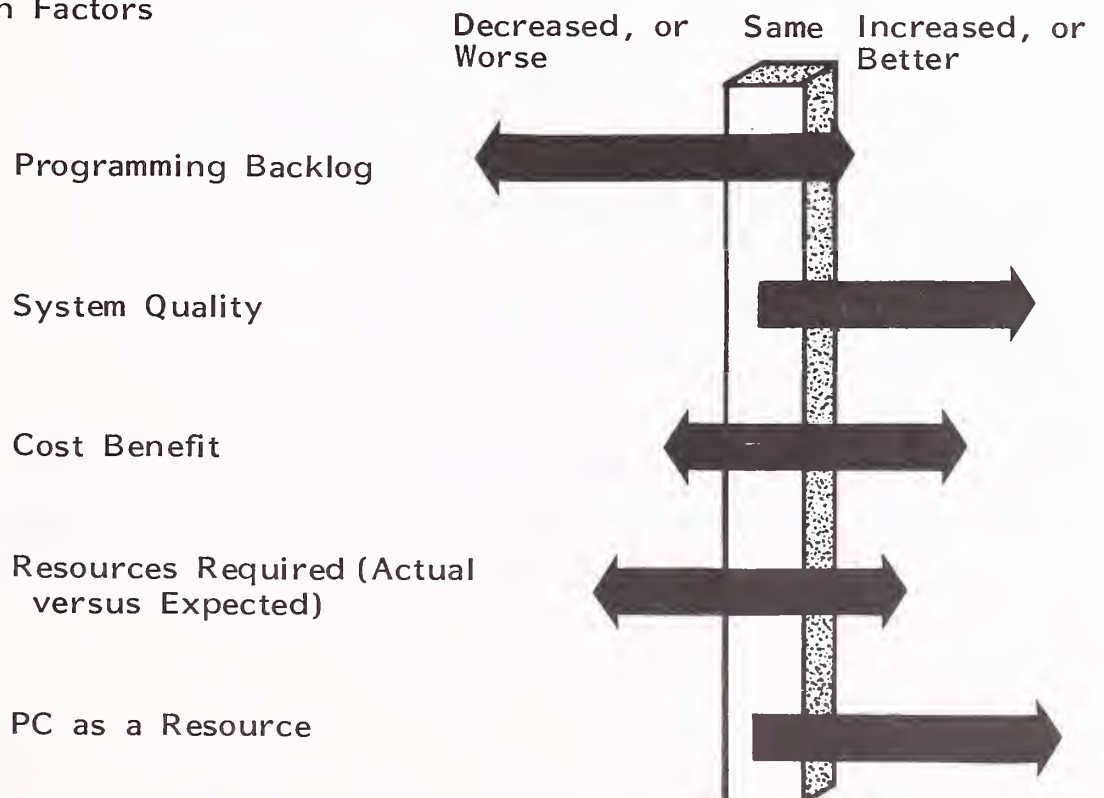
INPUT

EXHIBIT V-1

SATISFACTION LEVELS

User (Overall)	Improved/High	90%
	Same	10%
	Worse 0%	

0　10　20　30　40　50　60　70　80　90　100%

Highest Needs Perceived

- Better Micro-Mainframe Applications Linkage
- Improved Human Factors

| Information Systems Management		Decreased, or Worse	Same	Increased, or Better
	Programming Backlog			
	System Quality			
	Cost Benefit			
	Resources Required (Actual versus Expected)			
	PC as a Resource			

INPUT
UEIC

- One of the respondents offered the notion that "the success of the information center depends not on dollars but on attitude." INPUT agrees. The difficulty for IC management is that that attitude is tough to measure. This point suggests that IC management should solicit top management involvement in the IC and commit to the following credo:

  - Establish a marketing approach to the customer base, the user.

  - Create a service attitude in the IC staff and instill the desire to create a team approach in satisfying all key customers.

  - Commit and deliver.

- INPUT believes the IC represents an opportunity for IS to help the corporation really enjoy the benefits of IS as a corporate resource.

C.   PRODUCTS AND SERVICES

- As one might expect, the survey revealed a wide array of products and services offered by the IC. Actually, INPUT expected to see an even wider range, given all the quality products available today.

- INPUT believes the IC will experience demand for an even greater variety of products and services over the next several years.

- To get an idea of the acceptance of the microcomputer in the IC, consider that 25% of the hardware installed is now micro based, as illustrated in Exhibit V-2. In addition, both medium and large mainframes are being used in the IC.

INPUT

EXHIBIT V-2

PRODUCTS: SERVICES INSTALLED IN ICs

Mainframe Computer

Microcomputer
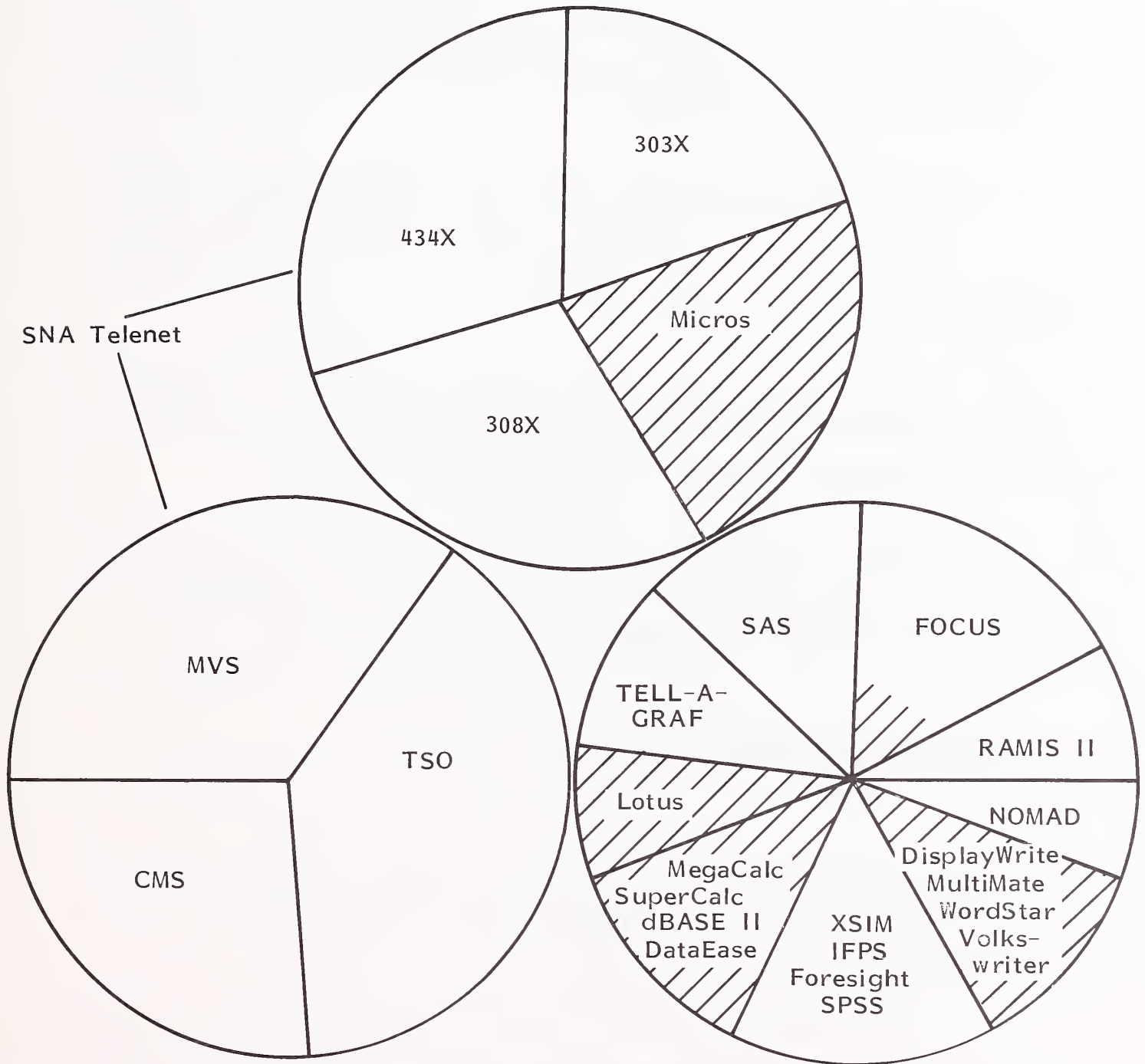
- The exhibit also reveals that nearly 40% of the software packages installed is micro based. Of course, the low cost of micro software accounts for a great deal of this high percentage.

- Generally, all the products installed can be used as decision support systems. INPUT expects this to shift and to include more production-oriented applications over the next several years.

    - These production-oriented applications or pseudo production applications will include applications like order tracking, accounts receivable dunning systems, division trial balancing, and other operational applications.

    - INPUT does not expect end-user departments to do their own general ledger or accounts payable, but these departments will demand that more and more data be downloaded from these systems.

- INPUT expects the number and type of products and services will increase rapidly, putting an extra strain on the IC for support, training, and assistance in product selection and in problem-solving consulting service.

D.   ROLE OF THE PERSONAL COMPUTER

- INPUT believes that personal computers are becoming and should become an integral part of the offering of the IC. They are a logical extension of the IC concept.

    - The IC and the PC both are tools for end-user computing. In fact, many corporations have organizationally combined these to form end-user computing departments.

- 50 -

INPUT

- Furthermore, the corporation benefits from having these tools under the control of the IC and IS where there is a professional staff knowledgeable in hardware selection and procurement, security, data administration, and so on.

- INPUT feels there are also a number of user satisfaction benefits to be gained.

  - When users have their own machines they don't worry about "the computer" being down.

  - Having their own computers makes users feel more in control and more responsible.

  - Having their own computers gets users more involved in information processing and makes them more knowledgeable and able to contribute to overall corporate information goals and objectives.

- The majority of ICs today are using PCs as workstations tied into mainframes. Very few of these PCs are being networked or linked for uploading or downloading applications.

  - However, INPUT found that nearly 20% of the ICs consider micros to be the "backbone" of their operation. INPUT believes this approach will benefit users and the organization.

  - Although vendors claim that networked microsystems are growing rapidly, INPUT found no evidence to support these claims. Apparently, the current cost structures cannot be justified by potential uses.

- A major criterion for determining workstation selection has typically been cost. A year ago, when a PC was four times the cost of a conventional terminal, cost was a major factor. But by the end of this year that ratio will

- 51 -

INPUT

be down to two to one, INPUT believes. This will make the choice more difficult on the basis of cost alone.

- Another trade-off created by personal computers is that of capacity. IC management has a very difficult task in planning capacity to meet user demand. Personal computers, being a much smaller capacity increment, can easily be added at low cost increments. This may even be a greater consideration in the case of multiuser microcomputer systems. As the multiuser microsystems mature, they will offer IC management the ability to configure and support "departmental" systems that may place little demand on the IC mainframe.

- INPUT found that, of the number of terminals installed in the IC, PCs accounted for less than 6% in 1983 and will account for over 20% by the end of 1986.

- Personal computers represent an opportunity for IC management to address the needs of executives and their staffs, since the appeal of PCs may help lure them into becoming users, partially because of the popularity of personal computing. Understanding this need and establishing a plan to promote the IC with a special executive micro-based workstation, even though it is not much different than other managers' workstations, would be an effective marketing tactic.

- In the future, one of the biggest problems for IC management is going to be how to manage the IC resource when all these workstations start to demand data access. INPUT believes that without planning user education and support, these users--with their demands for data, complex queries, and data transfers--can tie up as much mainframe capacity as IC can buy.

- 52 -

INPUT

VI EMERGENCE OF THE DEVELOPMENT CENTER

- Like the information center, the development center (DC) is a concept. Only time will tell whether it will enjoy the success that the IC has had.

- Given the responses of this survey regarding programming staff and their use of ICs, fourth-generation languages, and so on, INPUT felt it was important to devote some discussion to this area.

A. IMPLICATIONS FOR THE INFORMATION CENTER

- Probably the biggest impact of the DC is the potential for competing demand for hardware budget within the IS organization. Although this may benefit hardware vendors, it is not clear whether the needs are so diverse to really justify separate machines and associated costs.

- One question that needs to be raised is: Are the needs of the development staff really sufficiently unique to justify a separate department and budget? Consider whether IS management should direct the IC to expand its charter and services to provide the tools and services needed by the development staff.

- INPUT recognizes that the needs of the development staff are different but wonders if they are so different that a separate department is required or is

- 53 -

INPUT

even potentially beneficial, especially if one considers the value of the IC in helping to close the communications gap.
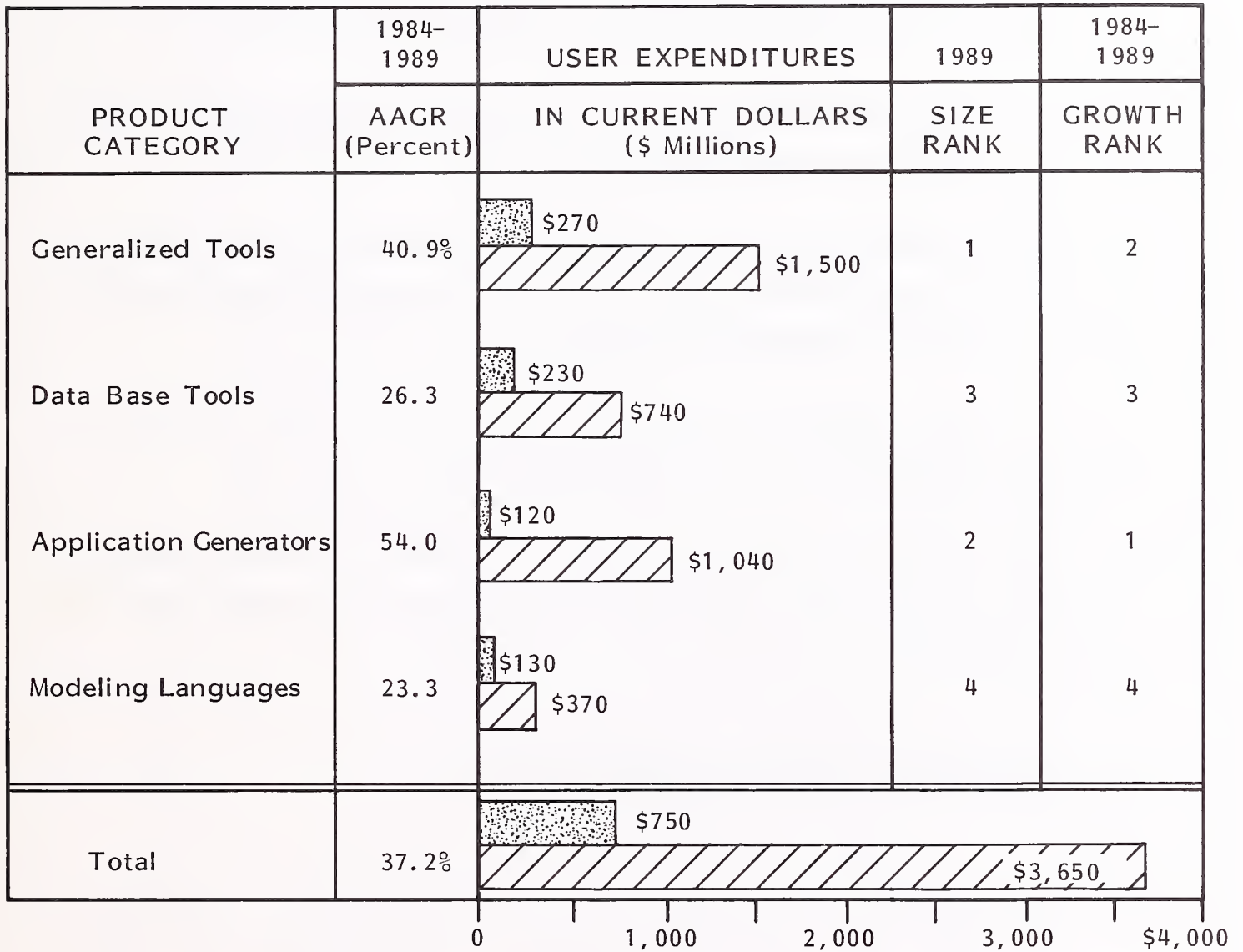
- Still, there is data that supports the DC concept. For example, the growth forecasted for the programming staff to use the IC is virtually flat, apparently due to the fact that this segment requires different tools, etc. than IC offers. As evidence of this, INPUT found the IC to be virtually devoid of such important development tools as application generators.

- INPUT suggests that IS, then, must decide whether to recognize the unique needs of the development staff and incorporate them into the IC product and service offering.

B.   FOURTH-GENERATION LANGUAGES

- The fourth-generation languages have played a major role in the success of the IC. Their capabilities have allowed end-user involvement to increase and develop.

- In a separate study, <u>Opportunities of Fourth-Generation Languages</u>, INPUT found that demand for these products will continue to grow over the next five years, at a nearly 40% average annual growth rate, as shown in Exhibit VI-I.

- The greatest growth will be in application generators, which will exceed 50% average annual growth. This is significant to the DC, since INPUT also believes the majority of the growth in application generators will result from use by the development staff, not end users. If this is true, demand for the the development center or DC-type tools in the IC will be very high and will at least force IS management to pay attention to the issue.

- 54 -

INPUT

EXHIBIT VI-1

FOURTH-GENERATION LANGUAGES - - MAJOR PRODUCT CATEGORIES

PRODUCT CATEGORY	1984-1989 AAGR (Percent)	USER EXPENDITURES IN CURRENT DOLLARS ($ Millions)	1989 SIZE RANK	1984-1989 GROWTH RANK
Generalized Tools	40.9%	$270 / $1,500	1	2
Data Base Tools	26.3	$230 / $740	3	3
Application Generators	54.0	$120 / $1,040	2	1
Modeling Languages	23.3	$130 / $370	4	4
Total	37.2%	$750 / $3,650		

0   1,000   2,000   3,000 $4,000

▨ 1984 User Expeditures

▱ 1989 User Expeditures

- 55 -

INPUT
UEIC

- Although the use of FGLs in the IC has grown, such growth has been nominal. The FGLs still account for less than 35% of the product mix in the information center.

- Another implication to be considered that will result from the growth of FGLs is the increased need for training, as a result of new users and of experienced users wanting to perform increasingly complex tasks.

    - Support will also be an issue, and for the more sophisticated user this means more knowledgeable support staff.

    - For newer users, one solution may be to begin cross-fertilizing by temporary end-user assignments in the IC using experienced end users in support and training capacities.

    - More experienced users could receive vendor training and then be responsible for internal training of others.

- INPUT believes techniques like the above will become increasingly important as the sophistication of the end user increases and as the sheer number of users increases.

C. SUMMARY OF THE DEVELOPMENT CENTER

- The emergence of the development center concept requires IS managers to at least explore how it fits their organization and their requirements. INPUT suggests considering the following issues:

    - Can the needs of the organization be served by a single information/development center, or are they such that separate service groups are really needed?

INPUT

-   Would the establishment of a DC provide a vehicle to make real inroads in dramatically reducing programming backlog?

-   Are the hardware requirements for the DC really different? Is the best solution a separate service center or additional hardware in the existing centers?

-   What would the establishment of the DC mean to the overall IS organization?

-   Does the existence of the IC and the emergence of the DC really mean that IS management should be looking at the big picture and exploring ideas for restructuring the entire organization rather than committing to piecemeal or Band-aid solutions?

-   Will the DC contribute long-term solutions to emerging problems such as data control and mainframe congestion from ad hoc user queries?

•   In summary, INPUT believes the development center is an unnecessary concept that would benefit vendor marketing strategies and development staff emotions but do little for the IS mission. This does not mean that some of the needs discussed, such as more appropriate development tools, are not required. They are required, and the IC should provide them. INPUT recommends that IS managers should analyze their organization's real needs and other potential solutions before jumping on the DC bandwagon.

INPUT

VII   STRATEGIC DIRECTIONS AND ISSUES

- This section includes INPUT's recommendations, discussion of growth characteristics, and analysis of future directions.

- INPUT believes one of the most important strategies for IS is to view the complexities of competition, the IC, personal computers, and outside vendors as manageable, deployable computing resources for the corporation. Any conflicts should be avoided so that IS management is in control--not embroiled in controversy.

### A.   DIVERSE DEMANDS: CORPORATE VERSUS END-USER NEEDS

- The corporate needs, especially those related to business operations and transaction processing, will always have priority over the needs of the end user.

    - IS has a great deal of experience in forecasting these operational needs in order to plan capacity and staffing. On the other hand, little history is available to accurately forecast the growth of end-user needs. INPUT found that IS had little data to support the current operational need, let alone the capacity required for growth.

INPUT

- In addition, many corporate needs are relatively easy to measure on a return-on-investment basis. The only measure of end-user needs is a nebulous concept called productivity, which is easy to measure in a production environment but not in a white-collar environment.

- As an example of the diversity of demands, IC management can examine the diversity within the IC user community itself. The applications range from pseudo production systems to program development, and from office systems to decision support.

- Exhibit VII-I shows an overview of the diversity of user types, which range from executives to clerical personnel to programmers. There is clearly a call for enlightened management of these diverse needs and demands.

B.   GROWTH OF THE INFORMATION CENTER

- The information center continues to grow at a healthy pace, a pace that INPUT regards as aggressive but manageable. The size of the user base is getting to be significant enough that the rate of growth is approaching a manageable rate.

- Exhibit VII-I shows that, with the exception of the senior executive staff and senior executives, the rate of growth is 40% or less. The primary reason for this is that early peaks have stabilized and the base has been established, at least in most cases.

- The high percentage growth in use by the senior executive staff is due to the scarcity of this type of user in the past. The percent increase is an important one because the rapid growth cycles are the most difficult to plan for and to manage.

INPUT

EXHIBIT VII-1

GROWTH OF INFORMATION CENTER USE, 1984-1989

(By Type of User)
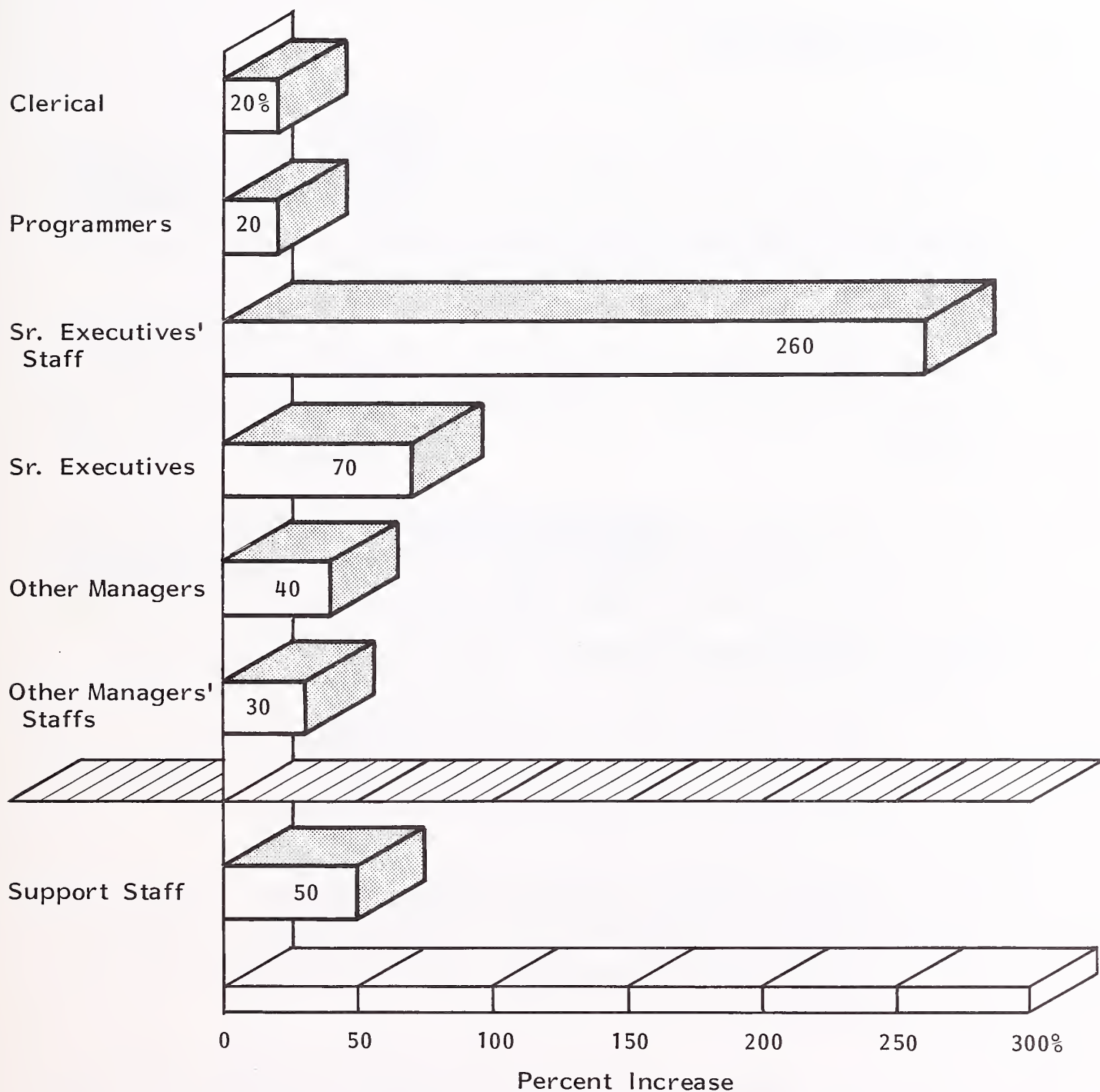
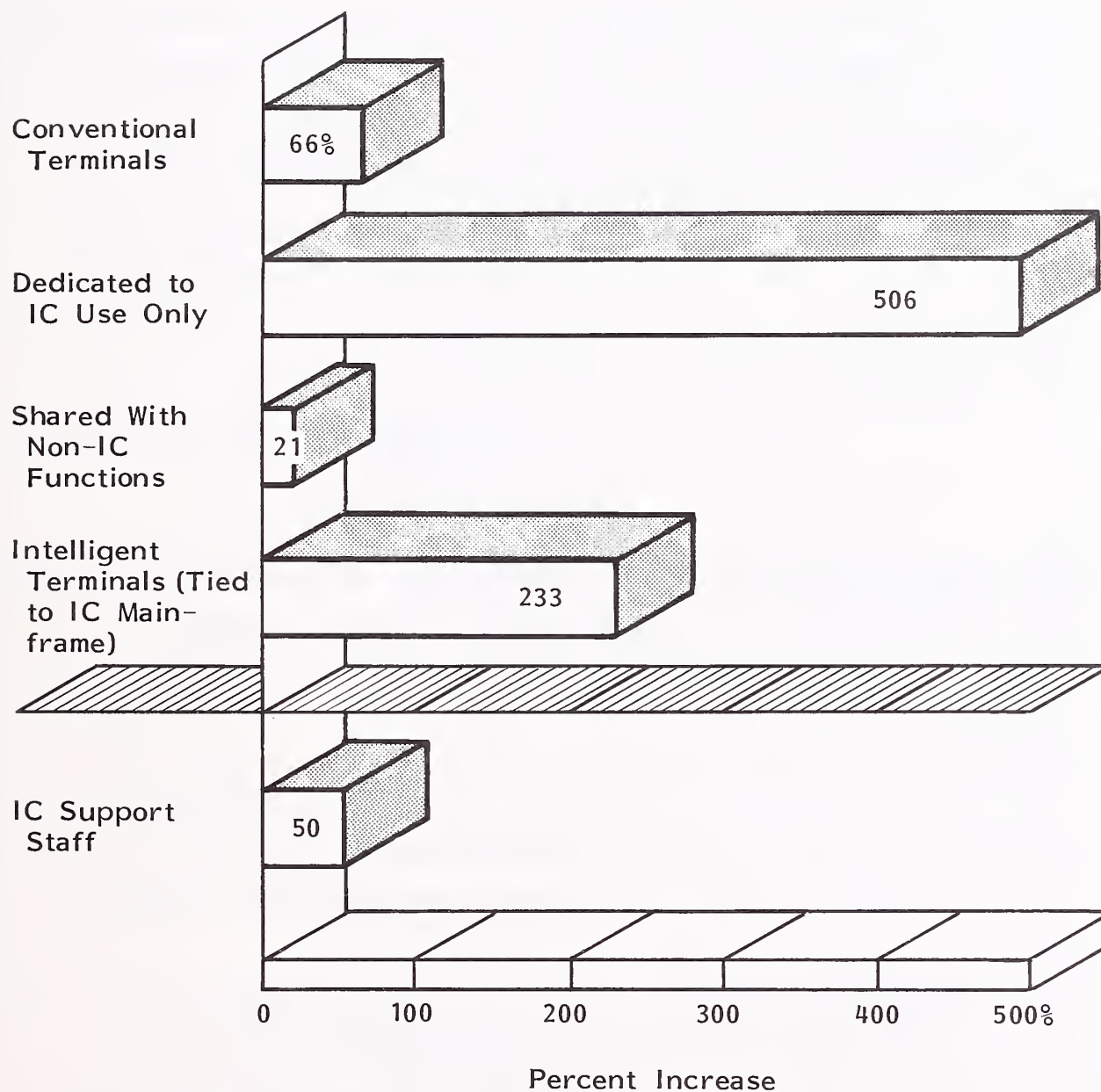Source: INPUT Survey of IS/IC Managers

INPUT
UEIC

- Another view of the growth pattern--growth by type of terminal--is included in Exhibit VII-2. A clear indicator of the acceptance of the IC is the growth rate (506%) in the use of terminals dedicated to IC-use only.

C. FUTURE DIRECTIONS

- What seems to typify the more advanced ICs is that they are service and support oriented, they are product sensitive, and they employ the initiative to advance new ideas and services and take the lead in areas like office systems and micro-to-mainframe links.

- Exhibit VII-3 describes the stages of the information center as defined by INPUT in the 1983 report. The following comments reflect updates to that exhibit:

    - The in-house timesharing stage is no longer viable, and organizations not advanced beyond this stage need to move rapidly into stages one and two before their users adopt other more expensive and less effective solutions on their own.

    - After analyzing this year's data, INPUT purports that 75% of the ICs are moving into stage 2, integration, and are actively implementing two or more of the characteristics identified in the exhibit.

    - Training is an area of major concern, and most ICs are only scratching the surface. For example, none of the respondents has advanced into computer-assisted methods other than a few experiments with outside vendors.

    - INPUT identified text and other office systems functions as characteristics of stage II. Over 20% of the ICs have identified the office

INPUT

EXHIBIT VII-2

GROWTH OF INFORMATION CENTER USE, 1984-1989

(By Type of Terminal)

Conventional Terminals — 66%

Dedicated to IC Use Only — 506

Shared With Non-IC Functions — 21

Intelligent Terminals (Tied to IC Main-frame) — 233

IC Support Staff — 50

Percent Increase axis: 0 100 200 300 400 500%

Source: INPUT Survey of IS/IC Managers

INPUT
UEIC

EXHIBIT VII-3

STAGES OF THE INFORMATION CENTER

STAGE	DESCRIPTION	CHARACTERISTICS
0	In-house Timesharing	• Pulling in of jobs on commerical timesharing • No software "portfolio" • Suboptional training and support
1	Information Center I: Service	• Software portfolio • Adequate, but expensive, training and support • Application consulting
2	Information Center II: Integration	• Integrated computer-based training • Semi-automated support • Integrated prototyping/design language • PC's mainframes integrated • More mainline systems • Text and other office systems functions
3	Information Center III: Intelligence	• Voice input • Voice output • Computable graphics design tools • Artificial intelligence systems

- 64 -

INPUT
UOIC UEIC

systems area as falling within the scope of responsibility of the IC. INPUT believes that the IC, with the help of microcomputer technology, will pioneer the direction in office systems. However, INPUT also believes different organizational alternatives will emerge as office systems reach more mature stages of development.

- Exhibits VII-4, VII-5, and VII-6, adopted from the 1983 report, show probable networking and system configurations in the various stages of development. To update these briefly, the current study found that departmental systems, Information Center II, are beginning to emerge. More interesting is the fact that several IC managers are already planning for stage 3 and believe the technology and cost structures will support the "super" stage by late 1985 or early 1986.

D.   RECOMMENDATIONS

- IS management should pause, take credit for the high level of acceptance of the information center, then proceed with efforts to maintain the service levels since competitive advantages can dissipate rapidly.

- The product and service offering of the IC should include departmental networked systems with departmental data bases that are subsets of the corporate data base. These systems should be supplemented by multiuser supermicros, file servers, and departmental electronic mail.

- Every IC should plan and schedule to progress through the stages of the information center described earlier in this section. Each IC will be different; but without planning, these developments—in particularly, technology management—will be increasingly more complex.
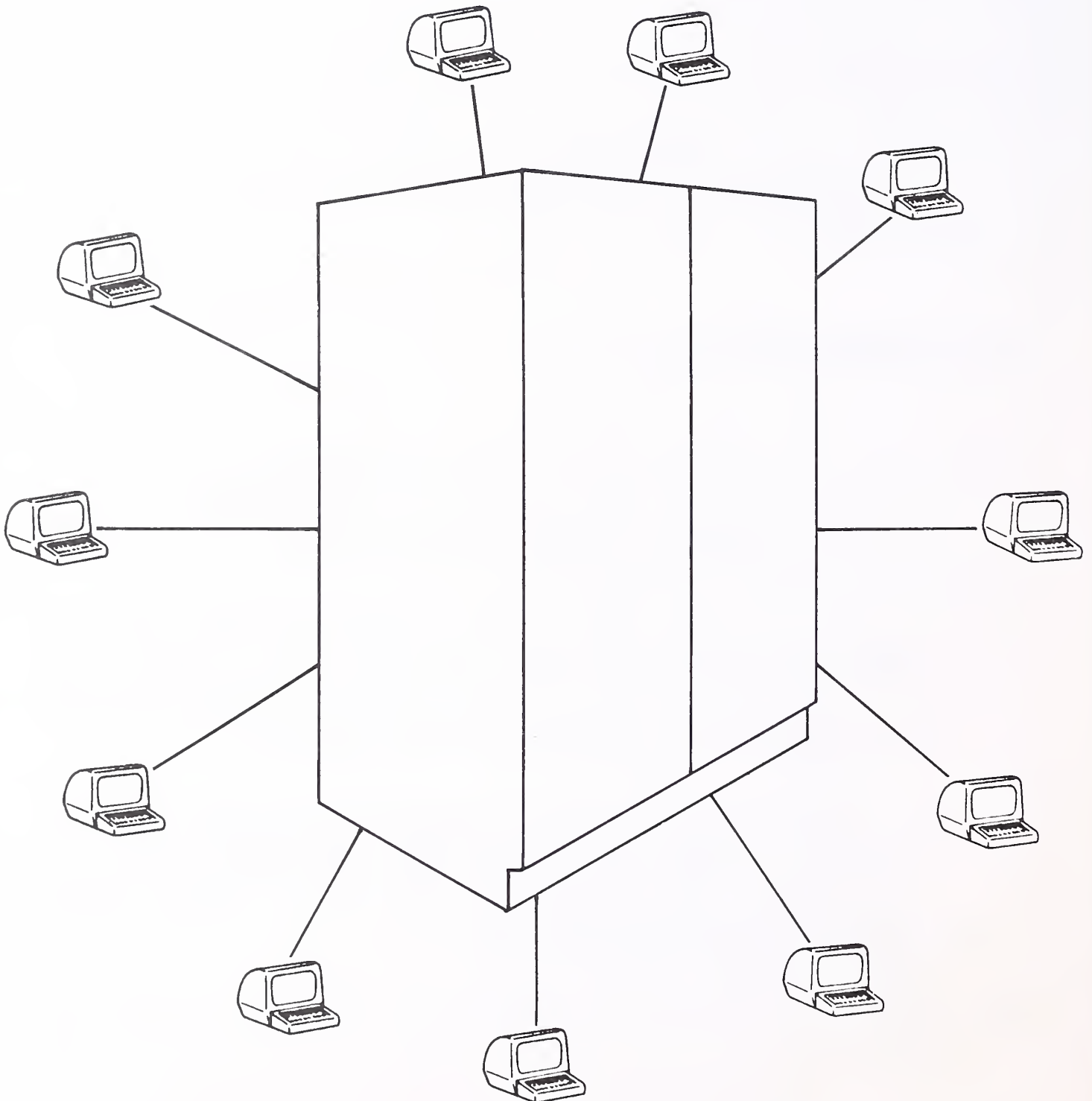
INPUT

EXHIBIT VII-4

INFORMATION CENTER I

INPUT
UOIC UEIC

EXHIBIT VII-5

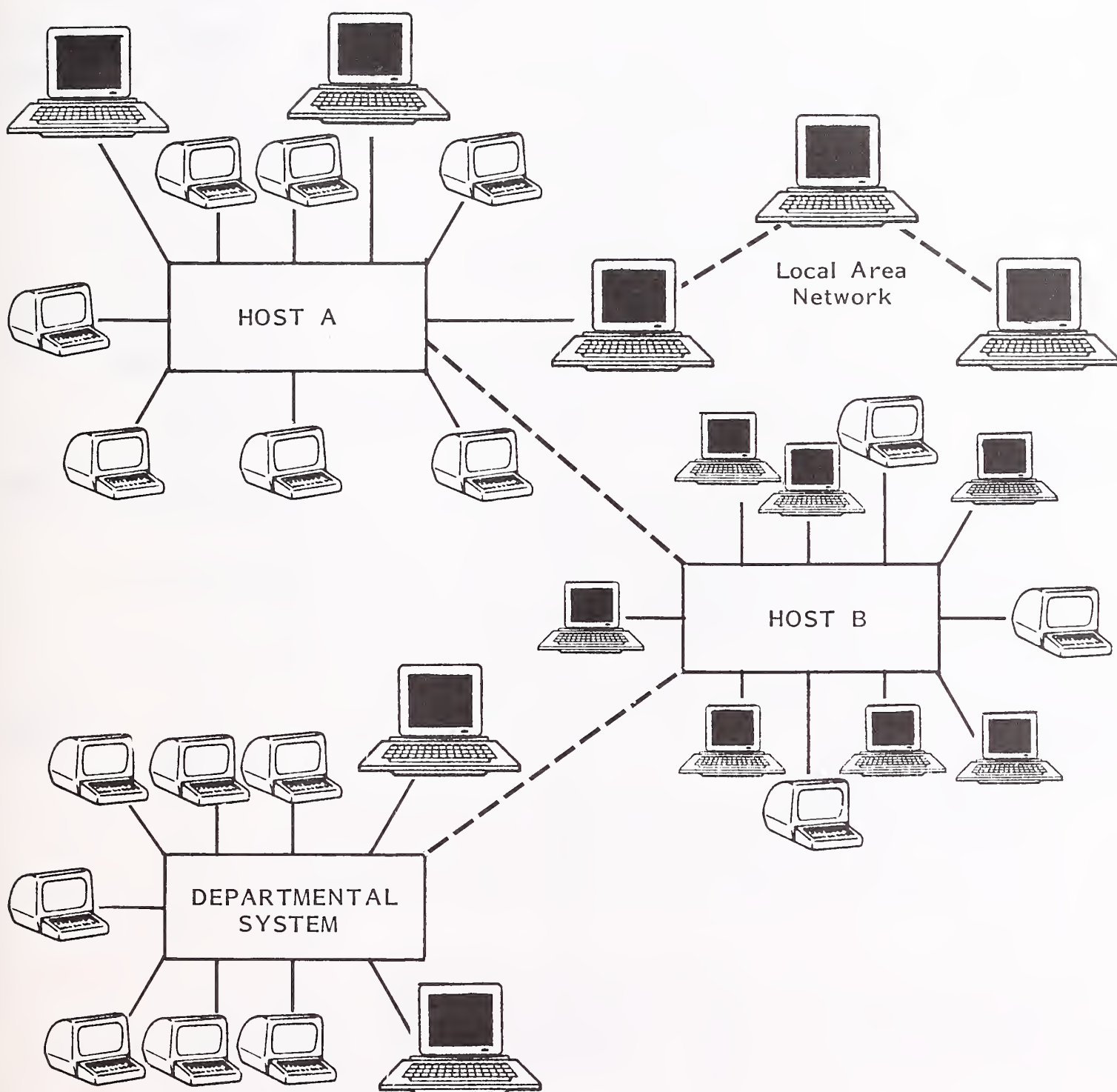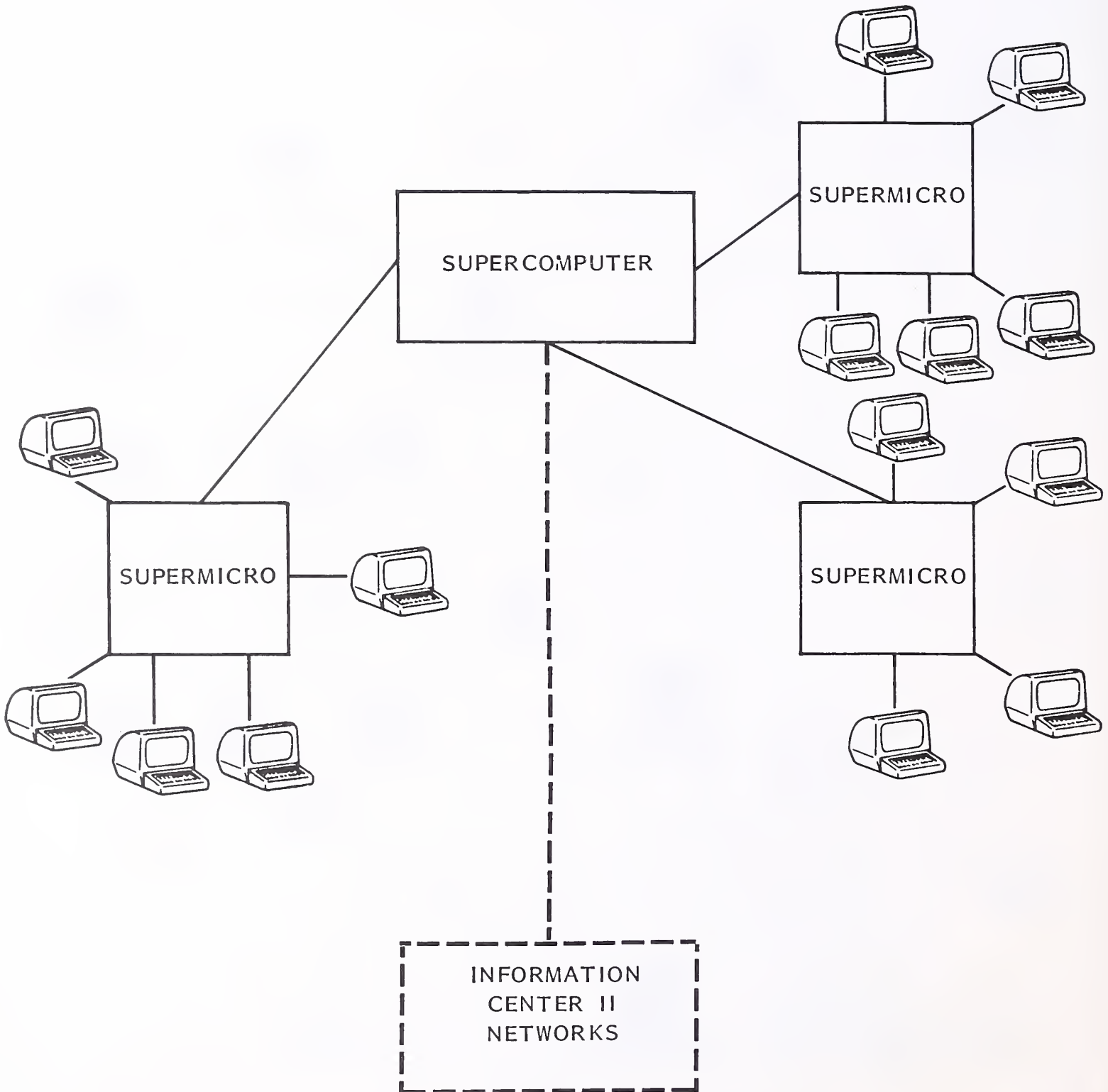# INFORMATION CENTER II

INPUT
UOIC UEIC

EXHIBIT VII-6

INFORMATION CENTER III

INPUT
UOIC UEIC

- If the IC is going to manage office systems development, a separate plan should be created and should include detailed research and analysis of all feasible data on office flows, human factors, and so on. INPUT believes automating the office is much more complex and more sensitive than many have anticipated in the past.

- The ICs should view PCs as their product and should provide service, support, and training for PC users. The ICs should also provide the appropriate micro-mainframe application linkages and data base services.

- ICs need to take the lead in testing and selecting integrated computer-based training and internal and external end-user training materials, courses, and seminars.

- ICs need to develop more sophisticated methods for tracking and planning hardware capacity requirements for their growing customer bases.

- INPUT strongly recommends that IS managers begin an in-depth analysis of the impact of their large user base on the mainframe data base and the main-frame itself as these users place more demands on the systems. IS managers should consider what will happen when dozens or hundreds or thousands of these users begin doing complex data queries and data transfers. INPUT believes this will become the critical issue for information center management in the second half of the eighties.

- INPUT recommends that ICs move rapidly to provide consulting service and support as part of their product and service offering, both as a competitive deterrent to the RCS vendor and as an enhancement to the logical development of the IC.

- Whether within the IC or in another organizational entity, IC management needs to track and plan for technological developments in artificial intelligence, voice input/output, and other emerging technologies.

INPUT

- IS management needs to take the initiative to sell the organization on the formula for the success of the IC; it is a combination of attitude, products, service, support, and technology. The alternative is to live with misinformed managers who think that applying technology will in itself solve information problems.

INPUT

INPUT® 1943 Landings Drive, Mountain View, CA 94043, (415) 960-3990